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PROTOZOAN AND FUNGAL DISEASES IN *SOLENOPSIS RICHTERI* AND *S. QUINQUECUSPIS* (HYMENOPTERA: FORMICIDAE) IN BUENOS AIRES PROVINCE, ARGENTINA

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ABSTRACT

The diversity and abundance of protozoa and fungi infecting colonies of the fire ants *Solenopsis richteri* Forel and *S. quinquecuspis* Forel were surveyed in Buenos Aires province, Argentina. A total of 185 roadside sites was selected, and 1,836 colonies were sampled and examined under phase-contrast microscopy. Pathogens were found at 32% of the sites and in 10% of the colonies. The microsporidium *Thelohania solenopsae* Knell, Allen & Hazard was the most common microorganism; it was present at 25% of the sites and 8% of the colonies. In some sites within the surveyed region, the percentage of infected colonies with *T. solenopsae* ranged from 40 to 80%. Other pathogens present were the microsporidium *Vairimorpha invictae* Jouvenaz & Ellis and the fungus *Myrmecomyces annellisae* Jouvenaz & Kimbrough. A field site was selected for future ecological studies.

Key Words: Microsporidia, fungi, natural enemies, biological control, imported fire ants, myrmecology.

RESUMEN

La diversidad y abundancia de protozoarios y hongos infectando colonias de las "hormigas coloradas" *Solenopsis richteri* Forel y *S. quinquecuspis* Forel fueron relevadas en la Provincia de Buenos Aires, Argentina. Un total de 185 sitios en banquina fueron seleccionados y 1.836 colonias fueron muestreadas y examinadas con microscopía de contraste de fase. Se encontraron patógenos en 32% de los sitios y 10% de las colonias. El microsporidio *Thelohania solenopsae* Knell, Allen y Hazard fue el más común de los microorganismos encontrados, estuvo presente en el 25% de los sitios y en 8% de las colonias. En algunos lugares de la región relevada, el porcentaje de colonias infectadas con *T. solenopsae* fue del 40 al 80%. Otros patógenos presentes fueron el microsporidio *Vairimorpha invictae* Jouvenaz y Ellis y el hongo *Myrmecomyces annellisae* Jouvenaz y Kimbrough. Fue seleccionado un sitio de campo para futuros estudios ecológicos.

The black imported fire ant, *Solenopsis richteri* Forel, and the red imported fire ant, *S. invicta* Buren, were accidentally introduced into the United States from South America (Lofgren 1986b). *S. richteri* has been displaced by *S. invicta* and now occurs in a relatively small area of northeastern Mississippi and northwestern Alabama. *S. invicta* has spread dramatically and has become one of the most serious medical and economic pests in 11 southeastern States and Puerto Rico (Adams 1986, Lofgren 1986a & 1986b, Mackay et al. 1992, Vinson & Mackay 1990, Vinson & Sorensen 1986).

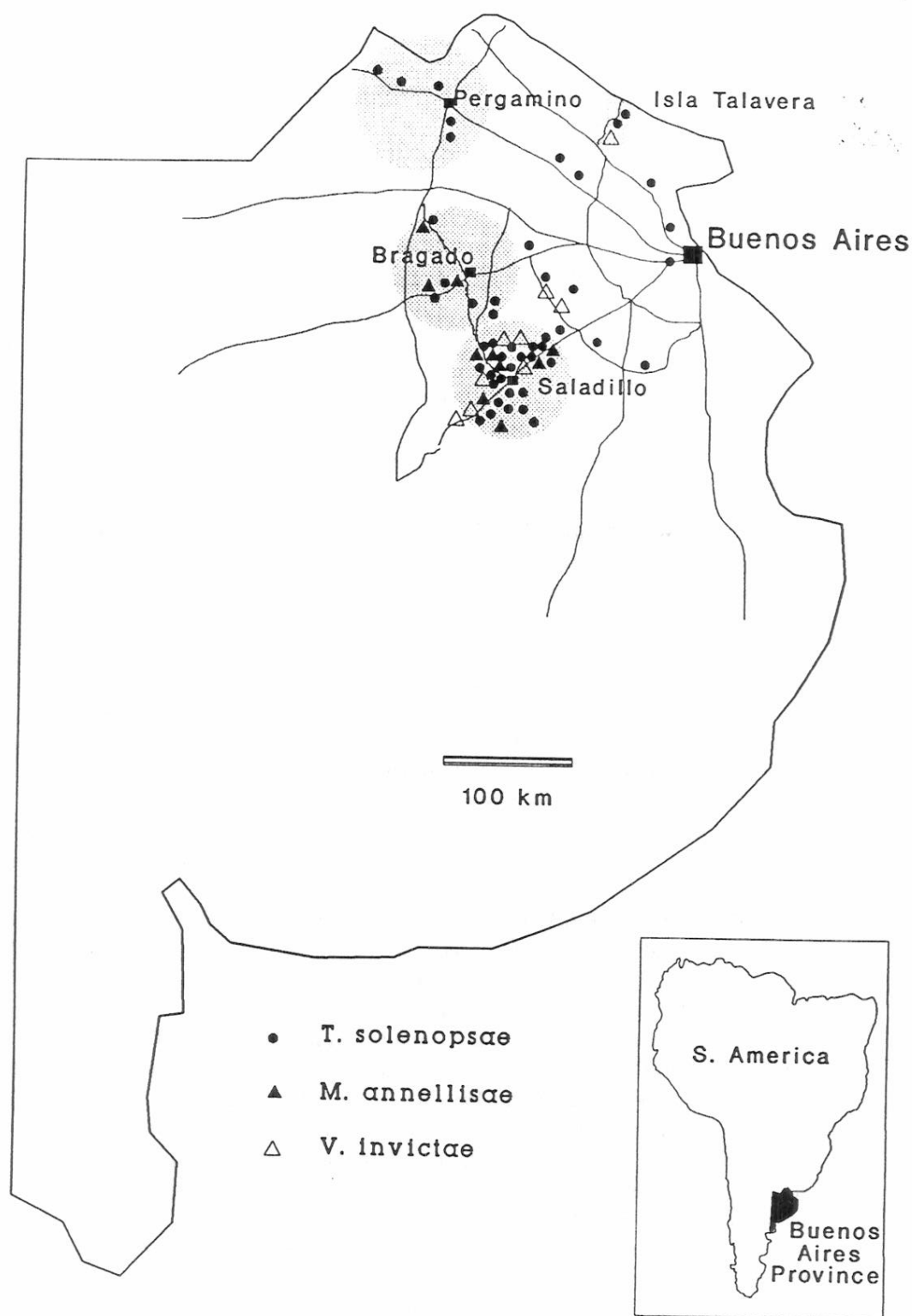


Figure 1. Region surveyed in Buenos Aires province and location of most of the pathogen-positive sites. Shaded areas show the main sampling areas.

it was present at 46 (25%) of the sites. The fungus *Myrmecomyces annellisae* Jouvenaz & Kimbrough (1991) (Deuteromycotina: Hyphomycetes) was found at 14 (8%) of the sites and the protozoan *Vairimorpha invictae* Jouvenaz & Ellis (1986) (Microsporida:

TABLE 2. PATHOGEN-POSITIVE COLONIES WITHIN AREA SURVEYED IN BUENOS AIRES PROVINCE.

Area	Number of Sampled Colonies	Number (%) of Colonies with Pathogens			
		<i>T. solenopsae</i>	<i>V. invicta</i>	<i>M. annellisae</i>	Total
Isla Talavera	90	24 (27)	6 (7)	0	30 (33)
Pergamino	175	29 (17)	0	0	29 (17)
Saladillo	613	49 (8)	12 (2)	14 (2)	75 (12)
Bragado	205	16 (8)	0	3 (<2)	19 (9)
Others	753	27 (<4)	2 (<1)	0	29 (4)
Total	1,836	145 (8)	20 (1)	17 (1)	182 (10)

venaz et al. 1980, Jouvenaz 1986, Jouvenaz & Ellis 1986, Wojcik 1986, Wojcik et al. 1987). In two surveys conducted in 1987 in the provinces of Buenos Aires, Santa Fe, and Entre Rios, Argentina, 10.5% of the fire ant colonies were infected with *T. solenopsae* (D. J. & D. W., unpublished data).

The relatively high prevalence of fire ant pathogens in Argentina and Brazil contrasts with the lack of specific pathogens in the North American populations of the black and red imported fire ants (Jouvenaz et al. 1977). Surveys in areas infested with both species of imported fire ants in the United States revealed few colonies infected with pathogens (Lofgren et al. 1975). Jouvenaz et al. (1977) reported considerable variation in the rate of infection of *S. invicta* with *M. annellisae* in Florida, Alabama and Georgia. This is probably the only (specific?) microorganism imported into the United States in association with the imported fire ants.

The prevalence of pathogens reported in this paper was probably underestimated because the sampling of the fire ant colonies included only adult workers. Possibly early infective stages were present in immature fire ants and missed. In addition, other pathogens known to occur in fire ants in South America, such as bacteria and viruses (Avery et al. 1977, Jouvenaz 1983) were not detected with the light microscope. The prevalence of these other pathogens deserves further investigation.

We conclude that, within the region surveyed, the microsporidium *T. solenopsae* was the most common pathogen of indigenous fire ant populations. In some sites, it infected a high proportion of the colonies. Therefore, it should be evaluated as a potential biological control agent for the imported fire ants in the United States. Although the areas of Isla Talavera and Pergamino showed higher number of colonies infected with *T. solenopsae*, the area of Saladillo was selected as the field study site because: (1) it showed the highest number of sites infected with *T. solenopsae*, (2) it was the only area where the three pathogens were present, (3) it represented the most appropriate habitat for future long-term ecological studies, and (4) it was near the USDA laboratory and frequent field work would be simplified.

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